

Algebra II Midterm

Review Solutions

Team # _____

① a. $(4x-2)(x+3) = \boxed{4x^2 + 10x - 6}$

3	$12x$	-6
x	$4x^2$	$-2x$

$4x - 2$

b. $(3x-1)^2 = (3x-1)(3x-1) = \boxed{9x^2 - 6x + 1}$

-1	$-3x$	1
$3x$	$9x^2$	$-3x$

$3x - 1$

c. $(2x^2 + y^2)^2 = (2x^2 + y^2)(2x^2 + y^2) = \boxed{4x^4 + 4x^2y^2 + y^4}$

y^2	$2x^2y^2$	y^4
$2x^2$	$4x^4$	$2x^2y^2$

$2x^2 \quad y^2$

Simplify completely.

No negative exponents or decimals

② a. $(4x^2y^3z)(-2x^3y^4z^2)$
 $= \boxed{-8 \cdot x^5 \cdot y^7 \cdot z^3}$

b. $\left(\frac{-3x^3y^2}{2xy^3} \right)^3 = \left(\frac{-3x^2}{2y} \right)^3$
 $= \boxed{\frac{-27x^6}{8y^3}}$

c. $(2xy^{-3}z^3)(-5x^3y^2z^{-2})$
 $= -10x^4y^{-1}z = \boxed{\frac{-10x^4z}{y}}$

③ Factor completely

A. $9x^2 - 6x \dots$ GCF
 $= \boxed{3x(3x - 2)}$

B. $16x^2 - 49 \dots$
 $= \boxed{(4x - 7)(4x + 7)}$

Difference of two squares

C. $4x^3 - 16x^2 - 20x$
 $4x(x^2 - 4x - 5)$
 $4x(x - 5)(x + 1)$

Solve using the Zero product property

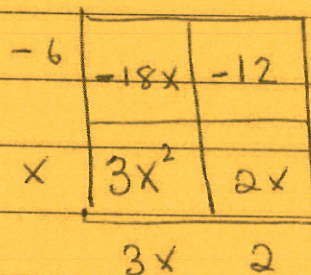
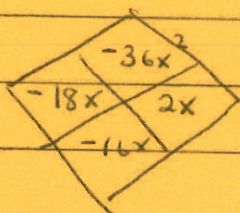
4) a. $x^2 - 8x + 16 = 0$

$$(x-4)(x-4) = 0$$

$$x-4=0 \quad x-4=0$$

$$\boxed{x=4} \text{ or } \boxed{x=4}$$

b. $3x^2 - 16x - 12 = 0$



$$3x^2 - 16x - 12 = 0$$

$$(x-6)(3x+2) = 0$$

$$x-6=0 \quad 3x+2=0$$

$$+6 \quad +6 \quad \text{or} \quad 3x = -2$$

$$\boxed{x=6} \text{ or } \boxed{x=-2/3}$$

c. $-x^2 + 12x = 0$... GCF

$$-x(x-12) = 0$$

$$-x=0 \quad x-12=0$$

$$\underline{-1} \quad \underline{-1} \quad \underline{+12} \quad \underline{+12}$$

$$\boxed{x=0} \text{ or } \boxed{x=12}$$

5 Solve. Record solution in ^{exact} & rounded form

$$x^2 + 3 = 5x$$

$$x^2 - 5x + 3 = 0$$

$$x = \frac{5 \pm \sqrt{25 - 4(1)(3)}}{2(1)} = \frac{5 \pm \sqrt{13}}{2}$$

Exact roots

$$x = \frac{5 + \sqrt{13}}{2}$$

or

$$x = \frac{5 - \sqrt{13}}{2}$$

Rounded roots

$$x \approx 4.30$$

$$x \approx 0.697$$

6 Solve each Absolute value equation.

A. $|2x - 1| = 7$

↙ ↘

$$2x - 1 = 7$$

$$2x - 1 = -7$$

$$2x = 8$$

$$2x = -6$$

$$x = 4$$

$$\text{or } x = -3$$

b. $|3 + 2x| = -5$

No solution!

c. $10 - |6 - 3x| = -30$

-10

-10

$$- |6 - 3x| = -40$$

$$|6 - 3x| = 40$$

$$6 - 3x = 40$$

$$6 - 3x = -40$$

$$-3x = 34$$

$$-3x = -46$$

$$x = -34\frac{1}{3}$$

$$x = 15\frac{1}{3}$$

$$x = -11\frac{1}{3}$$

I identify the domain & range

⑦ A. $D: -2 \leq x < 1$
 $R: 1 \leq y < 2$

b. $D: 1 \leq x \leq 2$
 $R: -2 \leq y \leq 2$

c. $D: \mathbb{R} \text{ except } x \neq 6$
 $R: \mathbb{R} \text{ except } y \neq 0$

⑧ Use the table to find the rule.

x	-1	0	1	2	3	4
y	8	3	0	-2	0	3

x-intercept

x-intercept

$x = 1$ or $x = 3$ so,

$y = (x-1)(x-3)$ Factored Form

$y = x^2 - 4x + 3$ Standard Form

⑨ Draw a complete graph of the system:
 $y < x^2 - 3x - 4$
 $y \geq -\frac{1}{2}x + 5$

$$y < x^2 - 3x - 4$$

$$(x - 4)(x + 1)$$

$$\boxed{x = 4, -1} \text{ x intercepts}$$

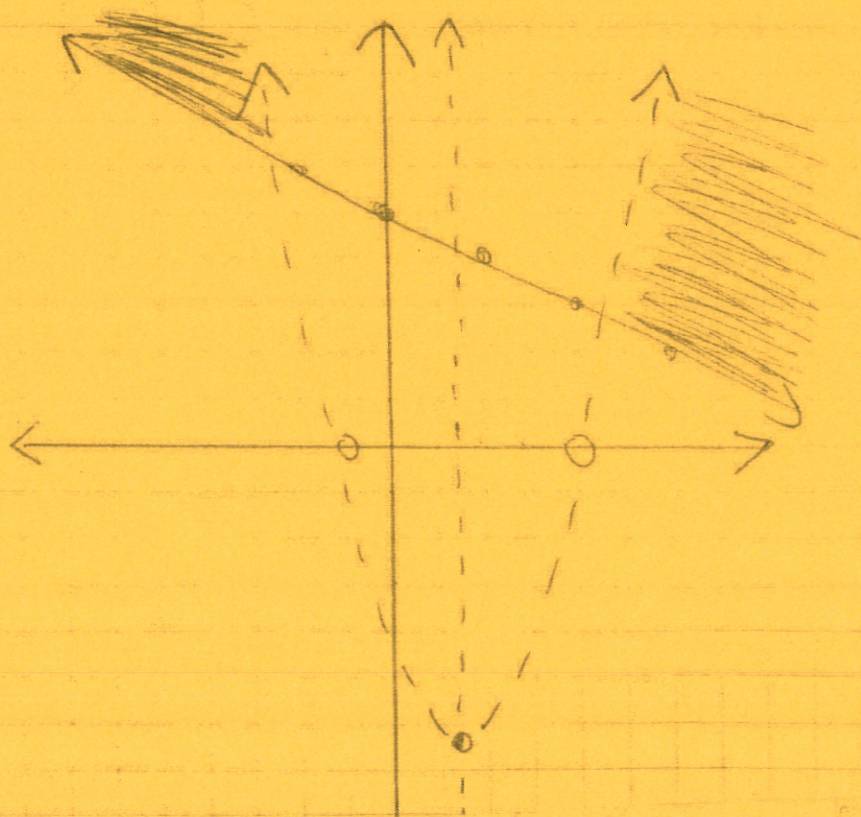
$$x = \frac{4 + (-1)}{2} = \frac{3}{2} = 1.5$$

$\boxed{x = 1.5}$ Axis of Symmetry

$$y = (1.5)^2 - 3(1.5) - 4$$

$$y = -6.25$$

$$\boxed{\text{Vertex } (1.5, -6.25)}$$



Given $y = x^2 + 3x - 18$

⑩ A. X-intercepts $(-6, 0)$ or $(3, 0)$

$$y = x^2 + 3x - 18$$

$$y = (x + 6)(x - 3)$$

$$x + 6 = 0 \quad x - 3 = 0$$

$$x = -6 \quad x = 3$$

B. vertex $(-1.5, -20.25)$

Axis of
Symmetry

$$x = \frac{-6 + 3}{2} = \frac{-3}{2} = -1.5$$

$$y = (-1.5)^2 + 3(-1.5) - 18 = -20.25$$

C. y intercept $(0, -18)$

$$y = 0^2 + 3(0) - 18$$

$$y = -18$$

⑪ Given $f(x) = \sqrt{2x - 8}$

a. $f(12) = \sqrt{2(12) - 8} = \sqrt{24 - 8} = \sqrt{16} = 4$

$$\boxed{f(12) = 4}$$

b. $f(6) = \sqrt{2(6) - 8} = \sqrt{12 - 8} = \sqrt{4} = 2$

$$f(6) = 2$$

c. $3^2 = \sqrt{2x - 8}^2$

$$9 = 2x - 8$$

$$17 = 2x$$

$$8.5 = x$$

$$\boxed{f(8.5) = 3}$$

Find the intersection(s)

(12)

$$3x^2 - 8x + 4 = 4x^2 - 6x + 1$$

$$0 = x^2 + 2x - 3$$

$$0 = (x+3)(x-1)$$

$$x = -3, x = 1$$

$$3(-3)^2 - 8(-3) + 4 = 55$$

$$3(1)^2 - 8(1) + 4 = -1$$

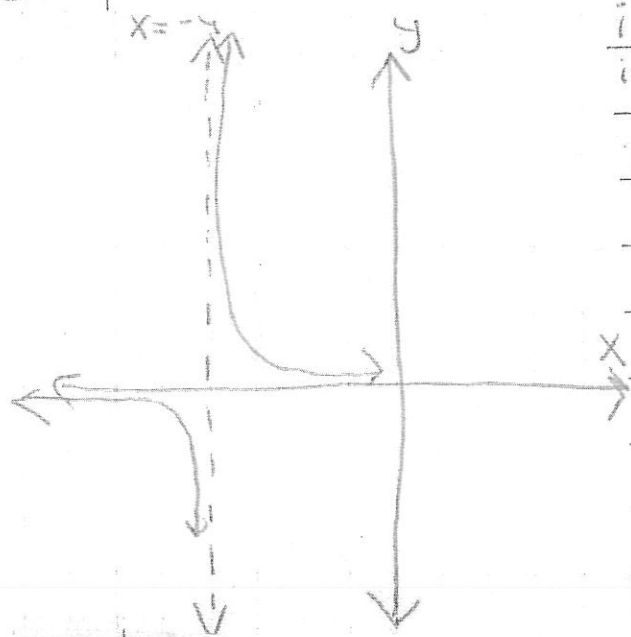
So intersections are

$$(-3, 55)$$

$$(1, -1)$$

(14)

Given $f(x) = \frac{1}{x+4}$



i Domain: \mathbb{R} except $x \neq -4$

ii Range: \mathbb{R} except $y \neq 0$

iii x intercepts \rightarrow none

iv y intercept $(0, 1/4)$

$$y = \frac{1}{0+4} = 1/4$$

v Equations of asymptotes:

Vertical Asymptote $x = -4$

Horizontal Asymptote $y = 0$

(13)

$$y = x^2$$

A. $y = (x+1)^2 + 3$

shift vertex horizontally left 1
 & vertically up 3

B. $y = -2(x+4)^2 - 1$

Reflection over x-axis

vertical stretch by a factor of 2

vertex shifted horizontally left 4

& vertically down 1

C. $y = \frac{2}{3}(x-3)^2 - 4$

compression by a factor of $\frac{2}{3}$

horizontal shift right 3

vertical shift down 4

D. $y = -\frac{1}{2}(x+3)^2 - 2$

Reflection over x-axis

E. $y = (x-4)^2 - 1$

F. $y = -4(x-2)^2 - 3$

G. $y = \frac{1}{3}(x-5)^2$